

WHAT IS CLAIMED IS:

1. A seat slide device comprising:
 - a lower rail having a channel structure;
 - an upper rail having a channel structure, the upper rail
 - 5 being slidably engaged with the lower rail in a manner to define therebetween an elongate enclosed space;
 - an elongate lock plate placed in the elongate enclosed space and secured to the lower rail;
 - a latch lever including a pawl portion and an input arm and
 - 10 placed in the elongate enclosed space, the latch lever being pivotally connected to the upper rail to pivot about a given axis that extends in parallel with the upper rail, the latch lever being pivotal between a lock position where the pawl portion is engaged with a part of the lock plate to establish a locked
 - 15 engagement between the lower and upper rails and an unlock position where the pawl portion is released from the lock plate to cancel the locked engagement, the latch lever being pivoted in a direction from the lock position to the unlock position when the input arm is applied with an external force;
 - 20 a spring member placed in the elongate enclosed space for biasing the latch lever to pivot toward the lock position; and
 - an opening formed in the upper rail for having a given part of the input arm projected outward therethrough.
- 25 2. A seat slide device as claimed in Claim 1, in which the lock plate has a generally L-shaped cross section including a lower base portion secured to the lower rail and a vertical wall portion formed with a plurality of aligned lock openings and in which the pawl portion of the latch lever includes a plurality of pawls which
- 30 are engaged with some of the aligned lock openings of the lock plate when the latch lever is in the lock position.
3. A seat slide device as claimed in Claim 2, further

comprising a supporting bracket placed in the elongate enclosed space and secured to the upper rail, the supporting bracket being formed with holding openings through which the pawls of the latch lever are engaged with the lock openings of the lock plate for establishing the lock position of the latch lever.

4. A seat slide device as claimed in Claim 3, in which the upper rail is formed with holding openings with which leading ends of the pawls of the latch lever are engaged when the latch lever assumes the lock position.

5. A seat slide device as claimed in Claim 4, in which the vertical wall portion of the lock plate is positioned between a portion of the supporting bracket where the holding openings are formed and a portion of the upper rail where the holding openings are formed, and in which the pawls of the latch lever pass through the holding openings of the supporting bracket, the lock openings of the lock plate and the holding portions of the upper rail when the latch lever is in the lock position.

6. A seat slide device as claimed in Claim 1, in which the latch lever comprises:

a bridge portion on which the pawls are integrally formed;
and

two side arms extending in the same direction from opposed ends of the bridge portion, one of the side arms constituting the input arm.

7. A seat slide device as claimed in Claim 6, in which the two side arms of the latch lever are pivotally held by first and second pin portions which are aligned and provided by respective bracket members secured to the upper rail.

8. A seat slide device as claimed in Claim 7, further comprising:

a stopper structure positioned in the elongate enclosed space and secured to the upper rail, the stopper structure having the first pin portion and a first channel portion; and

a catch portion formed on one end of the lock plate, the catch portion having a second channel portion, the second channel portion being slidably engaged with the first channel portion in such a manner as to suppress a vertical separation therebetween.

9. A seat slide device as claimed in Claim 6, in which the spring member is a curved bar spring, the curved bar spring having opposed ends pressed against an inside wall of the upper rail and a swelled center portion engaged with the bridge portion of the latch lever.

10. A seat slide device as claimed in Claim 9, in which the center portion of the curved bar spring is formed with projections which are meshed with projections formed on the bridge portion of the latch lever.

11. A seat slide device as claimed in Claim 3, further comprising:

a front stopper provided by a front portion of the lock plate;

a rear stopper provided by a rear portion of the lock plate; and

an edge portion provided by the supporting bracket, the edge portion being brought into abutment with the front and rear stoppers when the upper rail is brought to the frontmost and rearmost positions respectively relative to the lower rail.

12. A seat slide device as claimed in Claim 1, further comprising:

a front pair of sliders slidably installed in a front portion of the elongate enclosed space for smoothing movement of the upper rail relative to the lower rail;

a rear pair of sliders slidably installed in a rear portion of the elongate enclosed space for smoothing movement of the upper rail relative to the lower rail,

wherein the latch lever is positioned between the front and rear pairs of sliders.

13. A seat slide device as claimed in Claim 12, in which each of the sliders comprises:

a retainer of a generally L-shaped cross section including a base lower wall and a vertical side wall;

a roller rotatably held by the base lower wall; and

guide balls rotatably held by the vertical side wall,

wherein the roller and the guide balls each contact both the lower and upper rails.

14. A seat slide device as claimed in Claim 13, in which each of the sliders further comprises:

another vertical side wall possessed by the retainer; and

a projection possessed by the another vertical side wall

and slidably contacting the upper wall.

15. A seat slide device as claimed in Claim 1, in which the lock plate is secured to the lower rail by welding.

16. A seat slide device as claimed in Claim 1, in which the lock plate is secured to a vehicle floor through the lower rail by bolts.

17. A seat slide device as claimed in Claim 16, in which the

lock plate is formed at its longitudinal ends with bolt openings through which the bolts pass.

5 18. A seat slide device as claimed in Claim 16, in which the lock plate is formed at a portion near the bolt with an inclined surface, the top of the inclined surface being higher than the head of the bolt.

10 19. A seat slide device as claimed in Claim 1, further comprising a lock canceling mechanism which pushes the given part of the input arm when actuated.

20 20. A seat slide device as claimed in Claim 19, in which the lock canceling mechanism comprises:
15 a pivot member pivotally connected to the upper rail, the pivot member having a pushing lug that is positioned above the given part of the input arm that is projected through the opening of the upper rail;
a handle connected to the pivot member to pivot
20 therewith; and
a biasing spring associated with the handle to bias the pivot member in a direction to separate the pushing lug from the projected given part of the input arm.

25 21. A seat slide device as claimed in Claim 20, in which the lock canceling mechanism further comprises:
a stand secured to the upper rail, the stand having the pivot member pivotally connected thereto;
aligned openings possessed by the pivot member for
30 receiving therein one end of the handle.

22. A seat slide device as claimed in Claim 19, in which the lock canceling mechanism comprises:

a support plate including a horizontal wall portion secured to the upper wall and a vertical wall portion raised upward from a side edge of the horizontal wall portion;

5 a pivotal holder pivotally connected to the vertical wall portion through a shaft fixed to the vertical wall portion, the pivotal holder having a pushing arm that is positioned above the given part of the input arm that is projected through the opening of the upper rail;

10 a handle connected to the pivotal holder to pivot therewith; and

a return coil spring disposed about the shaft to bias the pivotal holder in a direction to separate the pushing arm from the projected given part of the input arm.

15 23. A seat slide device as claimed in Claim 19, in which the lock canceling mechanism comprises:

a side plate having a lower edge secured to the upper rail;

20 a pivot lever pivotally connected to the side plate, the pivot lever having a pushing lug that is positioned above the given part of the input arm that is projected from the opening of the upper rail;

a pivotal holder positioned above the pivot lever and pivotally connected to the side plate through a shaft fixed to the side plate;

25 a connecting lever having a lower end pivotally connected to the pivot lever and an upper end pivotally connected to the pivotal holder;

a handle connected to the pivotal holder to pivot therewith; and

30 a return coil spring disposed about the shaft to bias the pivotal holder and thus the pivot lever in a direction to separate the pushing lug of the pivot lever from the projected given part of the input arm.

24. A seat slide device as claimed in Claim 19, in which the lock canceling mechanism comprises:

- 5 a shaft extending along the upper rail and rotatably held by front and rear holders that are secured to the upper rail;
- a handle provided by bending a front part of the shaft;
- an wing structure secured to the shaft to pivot therewith, the wing structure having a pushing lever that is positioned above the given part of the input arm that is projected from the
- 10 opening of the upper rail; and
- a coil spring disposed about the shaft to bias the shaft and thus the wing structure in a direction to separate the pushing lever from the projected given part of the input arm.

15 25. A seat slide device as claimed in Claim 24, further comprising a connecting rod through which the pivotal movement of the shaft is transmitted to another shaft that is a part of a lock canceling mechanism employed in a partner seat slide device.

20

26. A seat slide device comprising:

- a lower rail having a generally U-shaped cross section;
- an upper rail having a generally reversed U-shaped cross section, the upper rail being slidably engaged with the lower rail
- 25 in a manner to define therebetween an elongate enclosed space;
- an elongate lock plate placed in the elongate enclosed space and secured to the lower rail, the lock plate being formed with a plurality of aligned lock openings;
- a latch lever including pawls and an input arm and placed
- 30 in the elongate enclosed space, the latch lever being pivotally connected to the upper rail to pivot between a lock position where the pawls are inserted into some of the lock openings to establish a locked engagement between the lower and upper

rails and an unlock position where the pawls are released from the lock openings to cancel the locked engagement, the latch lever being pivoted in a direction from the lock position to the unlock position when the input arm is pressed in a given direction;

5 a supporting bracket placed in the elongate enclosed space and secured to the upper rail, the supporting bracket being formed with holding openings through which the pawls the latch lever are engaged with the lock openings of the lock plate for
10 establishing the lock position of the latch lever;

holding openings formed in the upper rail with which leading ends of the pawls of the latch lever are engaged when the latch lever assumes the lock position;

15 a curved bar spring having opposed ends pressed against an inside wall of the upper rail and a swelled center portion pressed against the latch lever thereby to bias the latch lever to pivot toward the lock position;

an opening formed in the upper rail from which a given part of the input arm is projected outward; and

20 a lock canceling device mounted on the upper rail, the device pressing the given part of the input arm in the given direction when actuated.